The D minance f S dium

More than 90% of the osmotically active particles in the extracellular fluid (ECF) are sodium cations and anions such as chloride and bicarbonate. Whereas the dominant cation in the intracellular fluid (ICF) is potassium. Therefore, sodium plays a major role in the osmotic pressure in the ECF. The level of sodium almost completely determines the osmolality of the patient. Hypernatremic (increased sodium) patients exhibit hyperosmolality while hyponatremic (decreased sodium) patients exhibit hypo-osmolality.

This is true even when glucose and BUN levels are normal or extremely low. Extremely high levels of osmotically active substances (such as glucose in a diabetic patient) will have an effect on the osmolality, however. Normally glucose accounts for approximately 90 mg/dL (5 mosmol/L) in a healthy patient. If a diabetic patient's glucose is increased tenfold to 900 mg/dL, the glucose would now contribute 50 mosmol/L to the osmolality, which is significant.

Since sodium is the dominant particle of ECF osmolality, physiologic saline (commonly referred to as "normal" saline or 0.9% NaCl) is commonly used as a replacement fluid because it's osmolality is very close to the ECF osmolality of a normal patient.

Exercises

1. How many grams are present in each liter of 0.9% (physiologic) saline? **ANSWER**

2. How many millimoles are present in each liter of physiologic saline (molecular weight of NaCl ≈ 58)? **ANSWER**

3. What is the osmolality of physiologic saline? Express your answer in milliosmoles per liter. **ANSWER**

4. What is the osmolality of half-normal saline (0.45% NaCl)? Express your answer in milliosmoles per liter. **ANSWER**